

## Challenges of Harnessing and Development of Solid Mineral Resources in Taraba State, Nigeria

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### Abstract

This paper examines the challenges of harnessing the potential solid mineral resources in Taraba State. The State is blessed with several solid mineral resources that are widely distributed across its length and breadth. The absence of legislation and poor law enforcement in the mining sector not only deprived the nation of the enormous wealth available from this sector, but also put the health and lives of millions of people in jeopardy. The study used both primary and secondary sources of data. The researchers visited several mining sites to see some of these solid minerals. The study revealed that some of the solid mineral resources found in the state include Gypsum, Marble, Feldspar, Sapphire, Laterite, Salt, Zircon, Barytes amongst others. Some of the challenges revealed by this study are lack of reliable and adequate data that would convince individuals and organizations that these solid minerals are available in commercial quantities, high exchange rate, lack of capital investment in solid mineral sector, inadequacy of adequate and qualified manpower and lack of modern technology to process the solid minerals into finished or semi-finished products. The paper therefore recommended that adequate data showing the quantity and quality, availability, and locations of these solid minerals should be fully made available by Government, community participation, provision of modern technology to process the solid minerals from semi-finished and finished products should be provided by the concerned authorities and private sector participation should equally be encouraged.

**Keywords:** Challenges, harnessing, solid, minerals, Taraba State

### INTRODUCTION

Minerals are natural products in solid state and may be formed in a number of ways such as: solidification from an originally hot, molten material through cooling, solidification from gaseous state directly, generally because of rapid cooling, metamorphism involving change of composition of an originally formed mineral due to a change in temperature, pressure or chemical environment acting independently or in close cooperation of one another, and precipitation and evaporation from natural solutions under favourable conditions of temperature and chemical concentration (Parbin, 2010). Nigeria is blessed with several solid mineral resources that are widely distributed across the length and breadth of our land. However the dominance of oil as a major foreign exchange earner has completely over shadowed the over 34 other different minerals in 500 known mineral deposit sites across the 36 states and Federal capital (Policy Brief on Solid Mineral Sector for the National Assembly, 2016). The result has been a mono product economy and an underdeveloped non-oil sector, specifically the solid mineral sector. This sector was left in the hands of informal group of untrained and ill-equipped artisans who carried out their activities unregulated in several communities making negligible contributions to the overall Gross Domestic Product (GDP) of the country (Gushibet, Ali and Anga, 2015).

The absence of proper legislation and poor law enforcement in the mining sector not only deprived the nation of the potential wealth available from this sector, but also put the health and lives of millions of people in jeopardy. This stems from the dire environmental and health consequences of the traditional exploitation methods deployed by its practitioners. The death of about 162 children from lead poisoning traced to local processing of Gold in parts of Zamfara State, Northern Nigeria is a Case in point (Yahaya, 2010). Recent developments however revealed the inherent dangers of excessive dependence on oil. An embattled economy arising from the glut in international oil prices and resulting in insufficient revenue to pursue socioeconomic and infrastructural development in the nation, the fluctuations in revenue generated as a result of the restiveness in the oil producing region of the nation and the committed search for biofuels and other renewable sources by erstwhile major oil consuming nations as possible alternative to petroleum (Gushibet, Ali and Anga, 2015 & International Institute of Social Studies (2013). These inspired domestic pressures on policy makers to devise new strategies to offset the distortion brought about by a mono-product economy. The response has been the inevitable drive to develop the non-oil sector, exemplified by the policy to harness and develop the solid mineral sector of the Nigerian economy. This culminated in the Minerals and Mining Act of 2007 operationalized by the national Policy on Minerals and Metals approved in 2009 aimed at addressing the neglects of the past, respond to the new and global development in the sector and consider possible areas of future action (IISS, 2013).

After a year of implementing the policy, the Civil Society Legislative Advocacy Centre, (CISLAC) found it pertinent to examine and analyze the existing frameworks with a bid to suggesting possible reviews and reforms

by all concerned stakeholders were necessary. These are related to gaps affecting health, the environment, Water resources, Impacts on Agriculture, Livelihoods, Extractive Industry Transparency and Accountability and Local Content (Policy Brief on Solid Mineral Sector for the National Assembly, 2016). Under the 1946 minerals Act and regulation, it was the Federal Government that had the exclusive right to explore and exploit any solid minerals in Nigeria, with the Federal Ministry of Mines and Power, granting licenses to private individuals and organizations for the exploration and mining of these minerals.

In 1971, the Federal Government established the Nigeria Mining Corporation (NMC) with its headquarters in Jos. The company was charged (saddled) with the responsibility or task of exploring and prospecting for mining, processing and disposing minerals of various kinds in Nigeria (Taraba State inclusive). The NMC was equally empowered to engage in the smelting, roasting, assaying, amalgamating refining or treating minerals in any manner calculated to render the products and by-products of any such minerals marketable (NMC,2017).

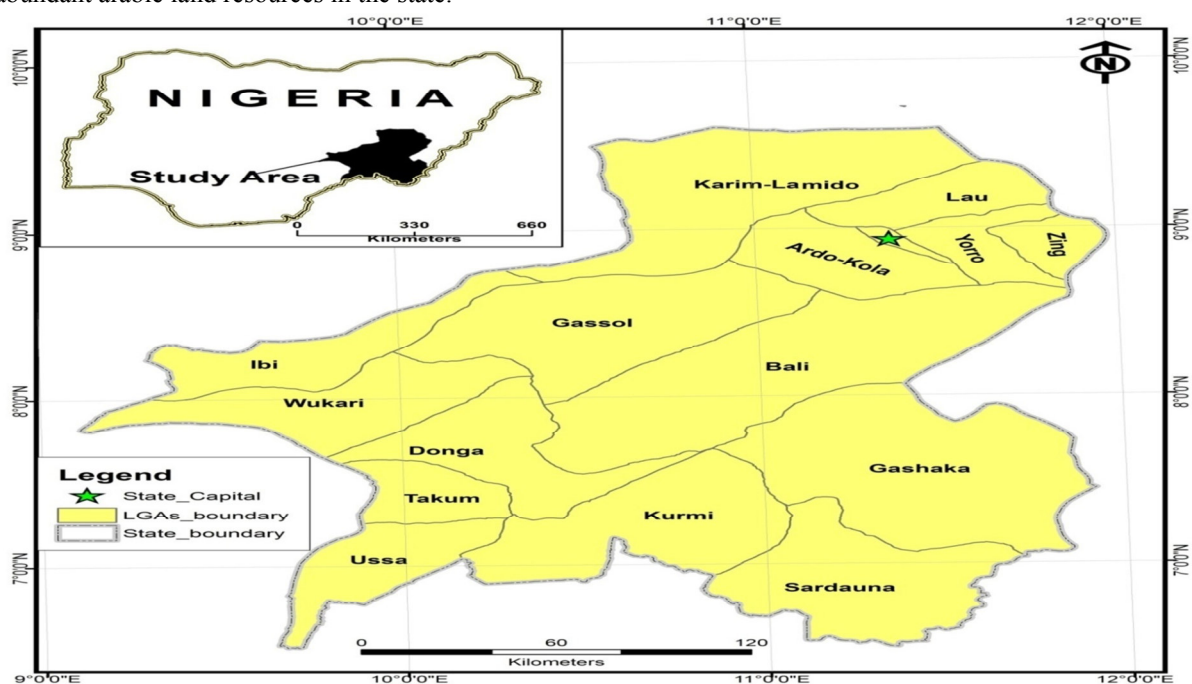
Although, reports by the Geological Survey Department of Federal Ministry of Mines and Power show that minerals abound in Nigeria, only few are being exploited, and only a few get to local and international markets. In other words, Nigeria has all along been relying so much on petroleum products, to the detriment of other mineral resources that would have made this country rely less on petroleum products. With the current economic recession in Nigeria, the country has no choice than to diversify her economy to solid minerals exploitation and agricultural sectors respectively as part of measure to come out of her present economic challenges.

Indeed, Taraba State is one of the states in the country that is richly endowed with abundant mineral resources that can be tapped by the Government, individuals or private organizations. Describing Taraba as land of abundance, the correspondent of Concord Group of newspapers, David, Z. (1993) noted that “mineral deposits which have not been exploited in commercial quantities include uranium, limestone and Gelana found in Yorro Local Government Area while lead, zinc, and salt barites are found in Wukari Local Government Area. Given the large scale production of crops and fairly large deposits of minerals, there are therefore, a lot of investment opportunities in Taraba State”. The aim of this paper is to identify various solid minerals potentials and to examine the challenges facing the exploration and exploitation of solid minerals in Taraba state and indeed in Nigeria.

#### Study Area:

##### Location

Taraba state lies roughly between latitude  $6^{\circ}30'$  and  $9^{\circ}30'N$ , and longitude  $9^{\circ}10'$  to  $11^{\circ}5'E$ . It is bounded on the North by Bauchi state and Gombe state in the North-East, and Adamawa state on the East, by Plateau state in the North-West (Fig 1). The state is further bounded to the west by both Nasarawa and Benue States, while it shares an international boundary with the Republic of Cameroon to the South and South-East (figure 1). The location of Taraba State makes it strategic for agricultural activities of diverse dimensions due to clement weather, good and abundant arable land resources in the state.

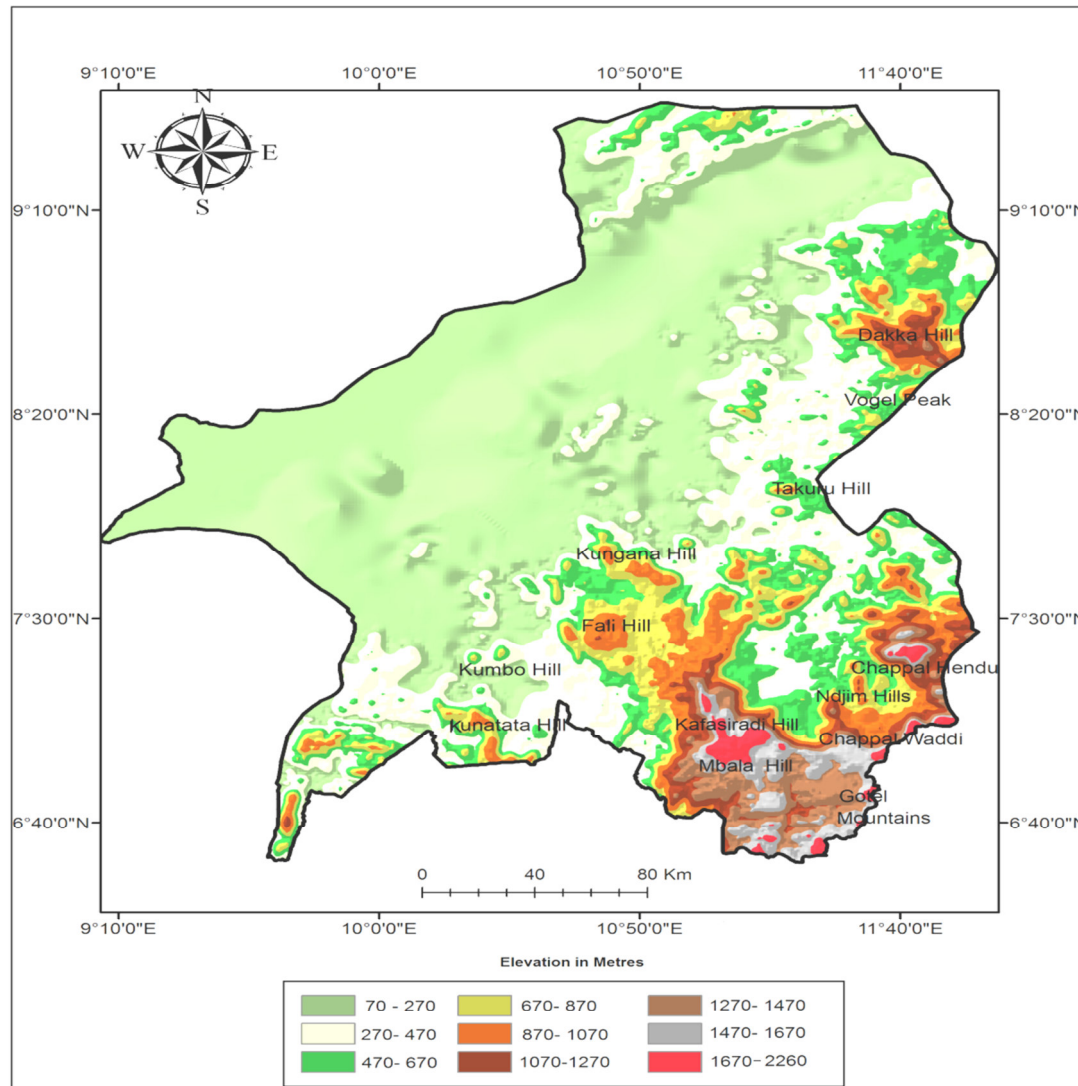


Source: Shenpam(2016)

Fig. 1: The Study Area (Taraba State)

### Relief and Drainage

Taraba state is divided into three topographical regions. West of River Benue, covering mostly Ibi and Karim Lamido Local Government Areas, are the extensive swamps of the Muri plains. This region is very thinly settled and virtually uncultivated. A marked contrast to flood-plains is the undulating lowland of the eastern Muri plains. This is broken by high rising hills such as the Kungana, Fali and Bali hills which developed on sandstones standing above 350m contour; hills are developed on both sedimentary and crystalline rocks (Shenpam, 1995). The existing water resources in the State is capable of improving agricultural production through the use of irrigation facilities in boosting dry season farming and guaranteeing food sufficiency. Also, the area has the potentials of fish production as the available water bodies transverse many communities.



Source: Shenpam (2016)

**Fig. 2: Relief of Taraba State**

### Methodology:

The data used for this study were sourced from both primary and secondary sources. A primary source of data was the direct report of the Authors who actually observed and participated in the survey. Apart from the interview conducted on the miners, government officials and the mineral merchants numbering 40 in the state, 340 respondents drawn from all the mining communities across the state were administered with structured questionnaire to elicit information mainly on the challenges facing the sector and how these challenges can be ameliorated. In this study, the researchers also visited the sites severally to see some of these solid minerals themselves and recorded all the information and issues observed. Secondary data were obtained from the database of Raw Materials Research and Development Council, Abuja, internet, and reports of Ministry of Mines, Abuja.

## Discussion

It is imperative to enumerate the major solid mineral resources of Taraba State which can be tapped in commercial quantities for sale at both local and international markets.

1. *Glass Sand/Quartz*: Silica Sand/Quartz constitutes one of the most readily available geological materials used in industries and factories such as glass manufacturing companies. Silica Sand/Quartz are said to consist of high optimal percentage of silicon dioxide ( $\text{SiO}_2$ ) which is a very good chemically stable element and it remains almost the same no matter the series of cycles it may have gone through, either in transportation or re-deposition. Quartz is silica occurring alone in pure state. Silica/glass sand on the other hand is products of weathering, erosion and transportation by rivers and/or the sea. Naturally occurring silica sands may contain some undesirable impurities like accessory hematite, rutile and dolomite etc.
2. *Bentonite*: Bentonite belongs to the group of clays whose technical properties are controlled by the proportion of montmorillonite, a sub-group within the smectitic clays. It is clay derived from deposits of weathered volcanic ash. Bentonites are hydrated aluminosilicates, which composed predominantly of the clay mineral montmorillonite. They are composed of a 3-tier structure with alumina sheets' sandwiched between tetrahedral silica units. The vast majority of the montmorillonites occurring in abundance worldwide is of the calcium type and is referred to as calcium bentonite. Much lower swelling and liquid limit values compared to natural sodium bentonite, characterize them. Calcium bentonite is used as a bleaching agent in cooking oil industries, bleaching agent in lubricant oil recycling, as a catalyst, absorber, filler, etc.
3. *Gypsum*: Gypsum is a hydrated sulphate of calcium, found usually in clays and limestone, sometimes associated with sulphur. It is the principal commercial form of hydrated calcium sulphate ( $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ ). It is usually formed by either the evaporation of salt in shallow inland seas or by the decomposition of pyrite ( $\text{FeS}$ ) in the presence of calcium carbonate.
4. *Feldspar*: Feldspar is a group of closely related rock forming aluminosilicate minerals, which contain varying proportions of potassium, sodium and calcium. The word "feldspar" is derived from the Swedish word "fald" meaning field and German word "Spat" which is said to refer to any transparent or translucent material which is readily clearable. Feldspar is the most abundant of all minerals, comprising over 50% of the earth's crust. It forms the major constituent of most igneous and metamorphic rocks, as well as arkosic sediments. Commercial feldspar occurs in feldspar rich pegmatite of older granites. Feldspars are valued as raw materials that form a vital input in ceramic, glass, paper, chemical, agricultural, pharmaceutical, paints, plastics and rubber industries.
5. *Granite*: Granite is a coarse-grained intrusive igneous rock composed primarily of light-coloured minerals. Crushed granites are small chips of granite, used as a base layer for paving. They are rock-aggregate used in building and general construction. Open pit mining or quarrying is used when the material is to be mined and crushed. The processes involved here are drilling and blasting.
6. *Marble*: is found in Lanadu, Zing Local Government area of Northern Taraba State. Marble is a naturally occurring form of calcium carbonate which has been, as a result of chemical processes, crystallized from limestone under heat and pressure, thereby forming a hard rock. The hard rock is used for sculpturing and toyish materials. Marble is a very good source of raw material for sculptures and industrial designers who produce carved materials as ornaments for decorations and beautification of houses and environment. Nigeria needs marble because of increasing quest for sculptures both at the local and international markets.
7. *Graphite*: Natural graphite flake is unique with extraordinary property of high electrical conductivity, flexibility and anisotropic thermal expansion. This is why the graphite has exceptional resistance to turn-in thermal shock, low coefficient of expansion distortion. However, graphite moulds are highly susceptible to damage and breakage, and must be handled with care. Graphite is another solid mineral found in commercial quantity in Taraba State especially in Mayo-Butale in Jalingo Local Government area (the Taraba State capital). Graphite is a naturally occurring form of carbon, which is softish, black material used in the manufacture of pencils, dry lubricants, paints, in electrical apparatuses and as a moderator in production of nuclear reactors. At this time, some of these materials are imported from other countries in high exchange rate. It is necessary they are produced locally so that their costs become affordable by local industries.
8. *Trona*: Trona (kanwa) also known as potash is one of the complex salts which is used for the production of Soda-ash.
9. *Bauxite*: Aluminum is the most abundant metal in nature representing about 8.2% of the earth's crust. Bauxite is currently the main source of the ore for the production of alumina from which aluminum is smelted.
10. *Magnite*: The Mambella Plateau in central senatorial zone of Taraba State, apart from other natural



resources harbors Magnetite in large quantity. It is a black iron spinel, an important iron ore used in the iron and steel industry. It is sometimes naturally magnetic, and should therefore be used in the manufacture of magnets and magnetic equipment use in industries and science laboratories, especially in chemistry and physics experiments. Its production and use in commercial quantity at this time in laboratory and industrial equipment are getting expensive hence it should be encouraged by all means to be locally produced in the country.

11. *Barytes*: Baryte is the principal ore of Barium, which is essential in the formulation of drilling mud. Drilling mud is a mixture of different types of chemicals in water or oil, which is used in water, solid minerals or petroleum drilling. Baryte is an important weighing ingredient and its usefulness as an addition in drilling mud is that when ground or crushed and added to the fluid, it increases the density of the fluid to counteract formation pressure as well as provide density to the drilling bit for drilling mud in the petroleum industry. The higher the specific gravity of Barite, the more useful it is in drilling mud formulation. It is found in three Local Government Areas namely Lau, Wukari and Ibi. The mineral is located in Benue River Basin and it is in large quantity in these areas along the river. Barytes is a natural Barium Sulphate with heavy spur, in silver-white colour. It is toxic divalent metallic element in the alkaline earth group use in the manufacture of insecticides, herbicides and paints. The exploitation of this solid mineral in large quantity should help the Companies manufacturing insecticides and other chemicals, reduce the cost of these raw materials, most of which are imported from other countries.
12. *Salt (evaporates)*: Brine springs and lake spreads are possible sources of crude salt in Nigeria. The concentration of salt in these springs has been estimated at 15 to 30 parts per thousand (Raw Material Research Development Council, 2010). Salt is found in Akwana in Wukari, Takum, Ussa, Karim Lamido Local Government areas of Taraba State. It is a metallic element of small density oxidizing rapidly when exposed to the air and reacting violently with water to liberate oxygen and gives solution of sodium chloride. It is used in the manufacture of common salt (table salt) and other industrial and laboratory chemicals. Infact, the salt in Akwana is already being exploited and processed locally by the people in the area, using the crude method. The earlier the mineral is produced in large quantities with modern method, the better for Taraba State, Nigeria and the people who need table salt to enrich their diet.
13. *Lead-Zinc*: Also in Arufu (Zurak) Wukari Local Government area is a deposit of lead-zinc, a soft dense, malleable and ductile substance. It is bright bluish in colour, but readily tarnishes to a dull grey colour. Lead is used in pipe work, as in plumbing and wiring and protective coverings or linings, type metal, solder and as a shield against radio activity. Its importance in modern industries and scientific development cannot be overemphasized.
14. *Laterite*: This is another mineral also found in Lau Local Government area in Taraba State. It is clay containing aluminum and iron-oxide, used in road construction as well as in building houses, both in modern and traditional architectures.
15. *Iron*: It is found near Jalingo, the State Capital and is useful in the iron and steel industry.
16. *Gelana*: is the ore of Lead, found in Ibi Local Government area of Taraba State. Ore is a naturally occurring, metallic compound from which the metal can be extracted.
17. *Zircon*: Zircon occurs as a wide spread accessory of alluvial tin concentrate especially around Jos, Odegi, Bauchi, Kaduna and Ondo, and Taraba States. Contains  $ZrSiO_4$  than 90% and impurities  $SiO_2 + Al_2O_3 + TiO_2 < 2\%$ . It is got by processing natural zircon sands and has refractoriness of between 21000C and 22000C.
18. *Sapphire*: Sapphire occurs in silica poor rocks such as Nepheline syenites, and other under-saturated alkali igneous rocks. It occurs as veins and segregations associated with peridotite. It may also occur in contact aureous in thermally altered alumina rich shale or impure limestone and, in aluminous xenoliths found within basic igneous rocks, where it is found in association with spinell, cordierite and orthopyroxene. Sapphire is not acted on by acids. Its hardness and physical properties are usually distinctive. Finely powdered sapphire heated with cobalt nitrate on charcoal assumes a fine blue colour.
19. *Fluorspar*: Fluorspar is used in the manufacture of steel, hydrofluoric acid and ceramic products. Fluorite and barite occur together or separately in hydrothermal veins or other cavity-filled deposits and in replacements, generally formed at low temperature. Although both fluorite and barite may be produced from the same deposits, generally the deposits of fluorspar occur in different areas from the deposits of barite.

**TABLE 1: SPATIAL DISTRIBUTION OF MAJOR MINERAL RESOURCES IN TARABA STATE.**

MINERALS	LOCATION	USES
Glass Sand/Quartz deposits	Jalingo, Takum, Bali, Ussa LGAs	The Glass Sand is used in the production of various glass products: which include sheet glasses for windows, bottles, mirrors, optical instruments, chemical apparatus, electrical insulation and condensers, pipe, doors, crucibles, automobile and aircraft bodies, filters and building blocks. They are also used for making abrasives and for gravel packing in the petroleum industries.
Gypsum	Karim Lamido, Ibi and Baissa (Kurmi) LGAs	More than 90% of gypsum is used in the building and construction industry while the remaining are used in the agriculture and health sectors. Gypsum deposit also play important role as a pathfinder in the petroleum industry by virtue of the fact that the organic material commonly associated with its formation is considered as source of hydrocarbon generation and its deposits act as seal for petroleum reservoirs. Gypsum is an important raw material in the production of Portland Cement, Plaster of Paris, School chalk, Wall board etc. Gypsum is also used extensively as a soil conditioner.
Feldspar	Jalingo, Yorro, Zing, Wakuyau, Baissa, and Ussa.	The alkalis and alumina contents are the two properties of feldspar that make it beneficial for industrial use. It is estimated that about 85.90% of feldspar produced is consumed by the glass and ceramic industries, although the proportion varies from country to country. Feldspar provides an inexpensive source of the alkali metals (sodium and potassium), and alumina. In the ceramic industry especially in the manufacture of white ware, feldspar is the second most important ingredient after clay. For glass manufacture, feldspar is still one of the important raw materials. Outside the use of feldspar as fluxes in the ceramic and glass industries, they are used as fillers and extenders in the paint, chemical, plastic, and rubber industries.
Bentonite	Gujba (Mutai)	Benitonite has a wide range of industrial uses. The physical and chemical properties of bentonite make it an important industrial mineral, which has widespread application in various industrial sectors, listed as follows: <ul style="list-style-type: none"> <li>- It is used as foundry sand bond in iron and steel foundries and in iron ore pelletizing in metallurgy; this is probably the largest use for bentonite;</li> <li>- As insulators in civil engineering;</li> <li>- As an efficient materials for drilling mud (because of the gel-like suspension it forms in water)</li> <li>- As bleaching clay in oil refining; clarifying and decolourising;</li> <li>- Filtering agent for clarifying wine, beer and treating waste water;</li> <li>- Ingredient in cosmetics, animal feeds and pharmaceutical;</li> <li>- Colloidal fillers for paints, and decolourising agent in food industries;</li> <li>- As soil conditioner, carrier for insecticides/pesticides, coating for seeds and mineral additive in agriculture.</li> <li>- Additive to ceramic raw materials to increase plasticity and enhance the strength;</li> <li>- Fire retarding materials;</li> <li>- As coating on some types of Computer papers, and non-carbon required multiple copy papers;</li> <li>- As cracking catalysts, bleaching agents, fillers and as dissociating agents in petroleum refining, and chemical industries;</li> <li>- As water impedance, where it prevents seepage loss from reservoir, irrigation ditches and waste disposal ponds.</li> </ul>
Zircon	Gashaka, Karim-Lamido, Sardauna, Takum and Ussa.	

MINERALS	LOCATION	USES
Salt	Akwana (Wukari) (Karim Lamido) Bomanda, Takum, Ussa LGAs	It is used in the manufacture of common salt (Table salt) and other industrial and laboratory chemicals.
Granite	Maisamari in Mambilla Plateau (Sarduna LGA)	Export for cutting and polishing
Bauxite	Mambilla Plateau	Used in setting up of alumina plant
Marble	Landau (Zing LGA)	Sculptures as in industrial design, ornaments for decoration of houses and environment.
Sapphire	Mambilla Plateau, Ussa, Takum	Ornaments for decoration
Graphite	Gayam, Jauro-Jalo (Gashaka) Mayo-Butale (Jalingo LGA)	Manufacture of pencils, dry lubricants, paints, electrical apparatuses and Nuclear reactors.
Trona	Zuno	Soda-ash is an important raw material in the manufacturing of glass.
Magnetite	Mambilla Plateau (Sarduna LGA)	Iron ore in the iron and steel industry, in the manufacture of magnets and magnetic equipment for science laboratories.
Barytes	Karim-Lamido, Ibi, Dungel, Alosi, Lau and Wukari.	The principal application of Barytes is as a weighting agent in drilling fluids for the petroleum and natural gas industries. Use of Barytes as filler materials in paper, paints, rubber, plastics etc. Industry is another potential area. Barytes is also used in the production of Barium compounds e.g. Barium Carbonate which is an important ingredient in the glass industry.
Lead-Zinc	Arufu (Zurak, Wukari LGA)	Manufacture of pipes and wires and protective coverings.
Fluorspar	Wukari	
Laterite	Lau LGA	Road construction, in building bridges and houses.
Iron stone	Jalingo LGA	Used in iron and steel industry
Gelana	Ibi LGA	Ore of lead used in iron and steel manufacturing

Source: Authors' Fieldwork, 2016

## 2.0 CHALLENGES OF EXPLORATION AND EXPLOITATION OF SOLID MINERALS IN TARABA STATE.

**Table 2 challenges of mineral exploration and development**

	Variable	Frequency	%
1.	Inadequacy of reliable adequate data	15	4.4
2.	Challenges for high exchange rate	23	6.8
3.	Inadequate capital investment in solid mineral sector	41	12.1
4.	Inadequate qualified manpower	54	15.9
5.	Poor access Road and transport network	61	17.9
6.	Erratic power supply and high energy costs	44	12.9
7.	Policy issues/weak institutional capacities	20	5.9
8.	Lack of modern technology for processing	11	3.2
9.	All of the above	71	20.9
	<b>Total</b>	<b>340</b>	<b>100</b>

Source: Authors' Fieldwork 2016

Solid minerals exploration and exploitation is faced with numerous challenges not only in Taraba State but Nigeria at large as shown in Table 2. Some of these include:

- a. Lack of reliable adequate data that would convince individuals and organizations that these solid minerals are available in large quantities to the extent that the huge investment in the business would

not be futile. Coupled with this is the fact that the demand for solid minerals at both local and international markets must be high.

- b. Challenges for high exchange rate: The high exchange rate of naira to dollars and other currencies is on the increase thereby constituting a great barrier to those involved in this business.
- c. Inadequate capital investment in solid mineral sector: There must be adequate capital for investment in the business. Many private companies and individuals would have liked to invest in the exploration and prospecting of solid minerals especially in procurement of machineries, in order to make it a viable venture.
- d. Inadequate qualified manpower: Companies involved in mining industry require the services of experts who are difficult to come by in Taraba State in particular and Nigeria at large. Those that venture into these businesses rely heavily on foreign expatriates, whose services are also expensive.  
 In a business where huge capital requirements are necessary for machineries and qualified man power, only those that are ready to take the bull by the horn will delve into it. It is against the background of the inability of the Nigeria Mining Corporation (NMC) to cope with the task of dealing with individuals and organizations in mineral exploration and processing that the Federal Government through its legislative arm is set to re-enact new law(s) which will encourage private initiative and capital into the solid mineral sector of the economy.
- e. Poor access Road and transport network: The topography of some of the areas where these minerals are located is difficult to access especially the Mambilla Plateau. Lack of good road network is a challenge to full harnessing of solid minerals in Taraba State.
- f. Erratic power supply and high energy cost is another challenge to solid mineral processing in the state. Some of these minerals need machines which rely on electricity to be processed into either semi-finished or finished products for good marketing.
- g. Lack of modern technology to process the solid minerals into finished or semi-finished products is a challenge in the State.
- h. Other challenges include Policy issues and weak institutional capacities has encouraged the thriving of illegal miners and have reduced the ability of the Mining Corporation to fulfill its statutory obligations of diversifying the economy of Nigeria as a nation. So the new Federal Government policy which is aimed at fully harnessing the over twenty (20) solid minerals available in commercial quantities in Nigeria should be strengthened to bring about a boost in the sector and by extension government revenue base.

The very important minerals found in commercial quantity in Nigeria which if fully harnessed will develop and diversify the state and national economies are tin, gold, limestone, glass, sand, zinc, clay, lead, cassiterite salt, gestone, marble, granite, kaolin, copper, silver, nickel, bentonite, asbestos, barytes, feldspar, radioactive minerals, phosphate, gypsum, diatomine, talc, and magnetite. These minerals, going by geological survey reports abound in the country in large quantities. It only requires the effort of Government, private individuals and organizations interested in the business to invest in it.

The Government should allow private individuals and organizations to come into the solid mineral business in order to reduce the problem of illegal mining in Nigeria. Certainly, illegal mining activities have had devastating consequences on the economy of Taraba State in particular and Nigeria at large. It deprives the Federal, State and Local Governments of huge revenue that would have been used in the provision of infrastructure and other basic facilities.

The business of illegal mining has been on in Taraba State before the state was created in August, 1991. The business is still thriving in many parts of the state especially in Gembu the Mambilla Plateau (Sarduna), Wukari and Ibi LGAs. Apart from its effects on the economy, it exposes the illegal miners to danger and it also exposes the environment to ecological disasters, eg gully erosion. For example, in July, 1992, fifteen (15) people died in a mining pit in Ibi Local Government area of southern Taraba State. They met their death while on routine search for precious stones at the eastern part of Ibi Local Government area (Apollos, 1994).

## Conclusion

Contributions of solid minerals to the National economy cannot be over emphasized. Against the backdrop of abundant solid mineral resources in Taraba State, the Federal and State Governments must take urgent steps to ensure that they are fully tapped for sale at the local and international markets. Taraba State Government must take the initiative to commission private consultants specializing in mineral exploration and exploitation to carry out comprehensive feasibility studies of each of the minerals. The feasibility report will give the Government an insight into the mineral potentials, their quantities, economic viability, costs implication for exploration and exploitation and the amount of money Government will realize from their exploitation. It is than that Government can invite private individuals and organizations to invest in the sector, with or without the Government participating in the venture. Government's efforts will in the end yield revenue through payment of



royalties and taxes by organizations engaged in the mineral exploitation thereby leading to major contribution to economic development of Taraba State in particular and the country at large. This may also help to bring the state and the country out of the present economic recession. Certainly, Tarabans stand to gain very much from mineral exploration and exploitation. Presently, Government's sources of revenue do not yield much thereby forcing it to depend so much on statutory allocation (Federation account), exploitation of solid mineral resources will help very much to put the state on a sound economic footing.

### Recommendations

1. **Reliable adequate data:** Adequate data for the quantity and quality, availability, and locations of these solid minerals should be fully made available by Government. This will convince private individuals and organizations that are interested to invest in the business to do so.
2. **Adequate capital investment:** There should be adequate capital investment in the solid mineral sector of the economy in order to make it more viable venture
3. **Security:** Adequate security should be provided by Government to ensure proper protection of lives and property of the investors. This will give the investors more confidence to invest their money in the business.
4. **Community participation:** Local communities should be allowed to participate in the business, as the solid minerals are exploited from their localities. Some of them should be employed as security guards. If the local communities are fully involved in the business, it will help in providing security for lives and property of the investors thereby eliminating the fear that would be entertained by the investors.
5. **Provision of funds:** Government at all levels and corporate bodies like banks should provide funds in form of loans for those that are willing to invest in this sector of the economy.
6. **Adequate qualified man power:** Companies involved in mining industries require the services of experts who are difficult to come by in Taraba state in particular and Nigeria in general. Qualified man power should be provided by the concern authorities. This can be done through training and re-training of the staff of the Ministry and agencies concerned.
7. **Construction of good road network:** Good roads should be constructed to make sure that the areas where these solid minerals are located are accessible. This will lead full harnessing of solid minerals in Taraba state, thereby contributing to economic development of the state.
8. **Modern Technology:** Provision of modern technology to process the solid minerals from semi-finished and finished products should be provided by the concern authorities. By such, it will make the sector a more viable venture for investors to invest in. Modern equipment for exploitation and exploration of solid minerals should be equally provided.
9. **Illegal miners:** Activities of illegal miners should be discouraged by the Government. Stringent legislations or laws should be promulgated and those found wanting should be prosecuted accordingly. Local communities should also be educated on the dangers involved in illegal mining.
10. **Private sector participation:** Private sectors and organizations should be encouraged to invest in this sector of the economy. If the private sectors and organizations are fully involved in solid mineral sector of the economy, it will assist in the Government derive to diversify the Nigeria economy from oil dependent to solid minerals and agricultural sectors of the economy. This will also assist in bringing Taraba state in particular and Nigeria at large out of the current economic recession.

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